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CURRENT INDUSTRIAL REPORTS

Selected Instruments and Related Products

1984

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U.S. Department of Commerce
BUREAU OF THE CENSUS

SUMMARY OF FINDINGS

During 1984, manufacturers' value of shipments of selected instruments and related products totaled $23,596.1 million, an increase of 12 percent over the 1983 value of shipments. This figure includes automatic regulating and control values $1,197.2 million, an increase of 4 percent over 1983; aeronautical, nautical, and navigational instruments, $1,535.6 million, an increase of 7 percent over 1983; controls for monitoring residential and commercial environments and appliance regulating controls, $1,884.6 million, an increase of 12 percent over 1983; process control instrumentation, $3,661.0 million, an increase of 11 percent over 1983; test equipment for testing electrical radio, and communication circuits and motors, $5,649.1 million, an increase of 16 percent over 1983; and analytical and scientific instruments, $2,543.1 million, an increase of 4 percent over 1983.

A description of the survey methodology and related information appear on page 20.

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Table 1. VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS, BY CLASS OF PRODUCT: 1975 TO 1984

(Millions of dollars)

Product code	Product description	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
34947	Automatic regulating and control valves	1,197.2	1,146.5	1,184.5	1,147.0	1,081.7	918.0	819.9	703.3	702.8	700.0
34948	Solenoid valves (except power transfer)	268.3	202.6	201.5	182.7	178.3	166.8	155.0	138.0	150.4	
38111	Aeronautical, nautical, and navigational instruments	[1]1,535.6	[1]1,428.6	[1]1,404.7	[1]1,326.6	[1]1,069.3	[1]945.3	[1]745.9	[1]775.3	[1]568.5	846.5
38112	Laboratory and scientific apparatus	1,044.8	976.2	1,028.1	899.6	840.9	705.1	688.0	611.8	472.0	442.8
38113	Surveying and drafting instruments	306.3	246.2	256.2	270.3	279.5	235.4	220.5	164.3	146.8	175.7
38220	Controls for monitoring residential and commercial environments and appliance regulating controls	1,884.6	1,678.8	1,439.4	1,472.9	1,417.0	1,261.0	1,157.8	1,125.3	936.6	709.1
38230	Process control instruments	3,661.0	3,289.9	3,750.8	3,423.2	3,030.3	2,635.9	2,072.2	1,906.1	1,407.7	1,318.3
38242	Integrating and totalizing meters for gas and liquids	484.2	449.4	493.5	565.1	600.1	450.8	366.6	334.3	280.8	252.9
38243	Counting devices	219.5	172.9	166.7	193.2	192.1	147.1	174.9	141.3	115.9	81.9
38251	Integrating instruments, electrical	410.1	358.0	339.0	303.7	297.4	284.9	241.0	216.0	172.4	188.7
38252	Test equipment for testing electrical, radio, and communication circuits and motors	5,649.1	4,878.7	4,384.4	3,854.6	3,295.5	2,847.4	2,242.0	1,706.0	1,411.4	1,363.5
38253	Instruments to measure electricity	621.2	540.8	539.0	567.7	514.4	497.8	457.4	399.8	426.4	393.0
38291	Aircraft engine instruments	356.8	335.2	290.3	275.1	258.9	196.8	159.6	115.1	95.6	103.9
38292	Physical properties and kinematic testing equipment	638.2	564.4	590.7	509.4	477.9	392.3	304.9	276.4	170.6	180.0
38293	Commercial, meteorological, and general purpose instruments	328.7	293.9	325.4	228.4	238.9	223.1	190.1	195.3	158.9	148.9
38294	Nuclear radiation detection and monitoring instruments	486.8	503.4	561.3	453.2	388.9	423.7	424.7	350.7	311.6	292.4
38326	Analytical and scientific instruments	2,543.1	2,438.6	1,990.3	1,740.0	1,518.2	1,284.4	1,110.6	872.6	513.5	902.2
38325	Optical instruments and lenses	1,432.5	1,059.9	893.7	871.9	797.0	615.9	482.0	373.3	311.0	
38324	Sighting, tracking, and fire-control equipment, optical type	528.1	479.2	492.2	324.4	310.4	266.3	204.2	208.0	159.0	155.5

[1]Product code 38111 was classified in 1976 to exclude aeronautical, nautical, and navigational instrumental systems which are classified in product class 36625 on survey MA36M, Selected Electronics and Associated Products.

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233 or call Donald E. Burgess, (301) 763-7492.

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Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
34947	Automatic valves (regulating and control type, except nuclear)	151	(X)	1,197,151	(X)	1,146,459
	Engineered specification valves, designed to perform a precise degree of continuous modulation of controlled variables as the final element of a sophisticated instrumentation loop (commonly referred to as control valves and including certain globe, butterfly, ball, diaphragm, and similar body types):					
	Pneumatic actuated: [a]	(X)	(X)	384,532	(X)	422,381
	Sliding stem valves [a]	(X)	300,904	170,364	269,396	175,227
	Globe body [a]	19	120,448	132,290	122,654	143,540
34947 01	All other types [a]	19	[c]180,456	38,074	[c]146,742	31,687
34947 02	Rotary valves [a]	(X)	25,291	43,212	26,540	68,337
	Ball [a]	8	22,967	40,572	24,494	45,906
34947 03	Butterfly [a]	8				
34947 04	Plug [a]	-	-	-	-	-
34947 06	All other rotary valves (including eccentric disk) [a]	5	2,324	2,640	2,046	2,431
34947 07	All other pneumatic power-operated control valves [a]	28	681,031	141,845	721,525	155,234
34947 08	Parts for pneumatic actuated valves (sold separately) [a]	26	(X)	59,111	(X)	63,583
34947 09	All other actuation, including electric-actuated and electro-hydraulic actuated [a]	(X)	(X)	234,710	(X)	225,133
	Sliding stem valves [a]	(X)	77,511	27,491	71,624	28,628
	Globe body [a]	10	[a]2,612	8,977	2,285	10,359
34947 11	All other types [a]	17	74,899	18,514	69,339	18,269
34947 12	Rotary valves [a]	(X)	2,985	6,602	3,179	8,305
	Ball [a]	3	[a]1,948	3,103	2,119	3,745
34947 13	Butterfly [a]	4	[b]1,037	3,499	1,060	4,560
34947 14	Plug [a]	2				
34947 16	All other rotary valves (including eccentric disk) [a]	2				
34947 17	All other power-operated (except pneumatic) control valves [a]	40	[a]5,475,315	181,278	[a]5,153,743	173,065
34947 18	Parts for all other power-operated (except pneumatic control valves [a]	21	(X)	19,339	(X)	15,135
34947 21	Valve actuators (sold separately)	21	213,965	64,452	[r]176,172	[r]55,418
34947 23	Regulator valves equipped with self-generating power actuator acting in response and in proportion to a change in value of the controlled variable, such as temperature, pressure, flow level, etc.:					
	Remote-sensing direct actuated temperature regulators	19	3,360,635	43,431	?,959,744	36,085
34947 25	Self-contained direct actuated pressure regulators (except instrument type and safety relief valves)	41	10,382,299	161,996	8,088,725	141,428
34947 30	Pilot (internal and external) actuated pressure regulators	34	[a]161,218	34,333	[r]133,568	[r]28,384
34947 35	Self-contained direct acting precision and instrument type pneumatic (air and gas) pressure regulators	14	345,668	23,204	[r]363,460	[r]28,595
34947 41	Flow regulators for gas, vapors, or liquids	34	7,780,680	117,837	[r]6,996,185	[r]92,814
34947 45	Other regulator valves	41	[c]2,331,418	95,463	[b]1,930,292	[r]88,664
34947 48	Parts for regulator valves (sold separately) [a]	30	(X)	37,193	(X)	27,777
34947 49	Solenoid valves (except nuclear)	50	(X)	268,250	(X)	202,621
34948	Solenoid valves of the type actuated by the movement of a plunger or armature due to the magnetic field created by electrically energizing a solenoid coil (excluding torque motor rotary type actuated valves and servovalves, and fluid power hydraulic and pneumatic solenoid valves):					
	Solenoid valves, except power transfer valves:					
	Commercial/Industrial types:	33	4,707,193	142,646	3,703,596	109,968
34948 56	Two-way	21	[a]1,143,440	40,120	995,663	[r]26,871
34948 58	Three-way	18	18,969,506	52,668	12,985,796	[r]41,075
34948 59	Other	1				
34948 61	Household appliance type	18	(X)	32,816	(X)	[r]24,707
34948 79	Parts, components, and operators for solenoid valves, except power transfer valves (sold separately)	89	(X)	1,535,648	(X)	1,428,578
38111	Aeronautical, nautical, and navigational instruments, except aircraft engine instruments	19	(X)	247,623	(X)	120,958
	Flight and navigation sensors, transmitters, and displays:					
38111 01	Compasses (magnetic and gyroscopic)	12	(X)	40,139	(X)	[r]41,948
38111 03	Radio navigation receivers and displays (including omni, radio magnetic, glide slope/localizer, DME, etc.)	14	(X)	46,578	(X)	46,868
38111 08	Altimeters (except radio and radar altimeters)	20	(X)	153,025	(X)	152,997
38111 10	Airspeed, indicators (including machmeters and air data computers)	8	(D)	(D)	(D)	(D)
38111 12	Acceleration indicators and systems components	11	[c]23,953	[a]16,808	[b]27,135	[a]15,505
38111 13	Rate-of-climb indicators	7	[c]4,603	10,355	[c]4,070	8,285
38111 15	Angle-of-attack indicators	3	(D)	(D)	(D)	(D)
38111 17	Bank and turn indicators	9	[c]31,188	36,626	[c]29,714	45,892
38111 22	Artificial horizon flight instruments	23	(X)	283,757	(X)	236,511
38111 20	Other aerospace and navigational instruments					

See footnotes at end of table.

Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983--Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Gyroscopes sold separately:					
38111 21	Vertical	6	[c]5,863	23,812	[r]5,951	20,635
38111 23	Directional	8	[c]30,276	51,695	[r]28,996	41,352
38111 25	Free, torqued and untorqued	1	(X)	56,781	(X)	62,649
38111 26	Rate, inertial grade	3				
38111 28	Rate, noninertial grade	4	(X)	56,408	(X)	56,223
	Airframe equipment instruments:					
38111 61	Position indicators (mechanical, as for landing gear, cowl flaps, stabilizers, etc.)	8	(X)	6,685	(X)	8,082
38111 63	Hydraulic system (both electrical and mechanical measuring means, as for liquid level and temperature and pressure indicators)	10	(X)	[b]26,257	(X)	25,175
38111 64	Cabin environmental measuring and control instrument (air-conditioning and heating, cabin pressure, oxygen, etc.)	15	(X)	26,156	(X)	22,036
38111 77	Thermocouple and thermocouple lead wire (aircraft type only)	4	(X)	341,962	(X)	[r]359,342
38111 80	Other aerospace flight instruments	25				
38111 85	Nautical instruments (all types, including temperature, speed, pitch, and roll instruments and system components, etc.)	17	[b]451,990	53,189	[b]502,853	65,449
38111 89	Parts and components for aeronautical, nautical, and navigational instruments, except aircraft engine instruments, (sold separately)[a]	5	(X)	(D)	(X)	(D)
38112	Laboratory and scientific apparatus	140	(X)	1,044,833	(X)	976,173
	Laboratory balances and scales:					
38112 20	Sensitivity of 5 centigrams or better	16	904,706	[b]54,981	890,578	[r]51,274
38112 22	Sensitivity of less than 5 centigrams	9				
38112 23	Laboratory furnaces and ovens	21	(X)	27,104	(X)	[r]22,772
	Laboratory centrifuges:					
38112 24	Table-top type	10	39,033	[a]38,144	[r]35,611	[a]35,935
	Floor type:					
38112 26	Refrigerated	3	[b]13,526	[a]85,011	[b]12,104	[a]71,883
38112 30	Other	4				
38112 27	Laboratory evaporation and distillation apparatus	13	(X)	[a]17,582	(X)	[r]20,145
38112 28	Laboratory sterilizers and autoclaves	7	(X)	12,644	(X)	13,252
38112 29	Laboratory burners and hot plates	8				
38112 31	Laboratory granulators, mills, and other particle size reduction apparatus	6	(X)	1,846	(X)	[r]1,593
38112 33	Laboratory dryers	10	(X)	1,824	(X)	[r]2,081
38112 35	Laboratory bleaders, mixers, shakers, dispensers, fraction collectors, and other liquid sample preparation apparatus	30	(X)	38,277	(X)	33,748
38112 36	Laboratory incubators	10	6,367	[b]25,413	[r]6,662	[r]21,385
38112 38	Laboratory freezers	11	21,102	[a]28,276	[r]10,388	[r]22,838
38112 98	All other laboratory and scientific apparatus not specified above (including wet and dry baths, melting point apparatus, laboratory pyrometers, etc.)	90	(X)	409,095	(X)	[r]374,980
38112 99	Components, parts and accessories for laboratory and scientific apparatus (sold separately)	41	(X)	304,636	(X)	304,307
38113	Surveying and drafting instruments and associated equipment and laboratory furniture	90	(X)	304,281	(X)	[r]244,164
38113 11	Surveying instruments, including alidades, transits, plumb bobs, sextants, theodolites, surveyors, compasses, surveyors levels, tapes, etc.[a]	17	(X)	32,938	(X)	[r]34,387
38113 19	Parts and components for surveying instruments (sold separately)[a]	1				
38113 21	Drafting instruments and machines, manual and automatic, plotting instruments, slide rules, T-squares, drafting templates, rules, etc.[a]	20				
38113 29	Parts and components for drafting instruments and machines (sold separately)[a]	1	(X)	[a]86,331	(X)	[r]77,625
38113 31	Photogrammetric and geodetic equipment, excluding cameras[a]	4				
38113 39	Parts and components for photogrammetric and geodetic equipment (sold separately)[a]	2				
38113 41	Laboratory furniture, including cabinets, cases, benches, tables, stools, and reagent shelves, etc	17	(X)	187,012	(X)	136,152
38113 49	Parts and components for laboratory furniture (sold separately)[a]	-	(X)	-	(X)	-

See footnotes at end of table.

Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984 Quantity	1984 Value	1983 Quantity	1983 Value
38220	Controls for monitoring residential and commercial environments and appliance regulating controls	75	(X)	1,884,584	(X)	1,678,842
	Automatic controls of the type principally used as components of air conditioning, refrigeration, and comfort heating (including pneumatic controls):					
	Temperature responsive (thermostats):	28	44,727,423	288,007	[r]36,658,785	230,320
38220 21	Electric	10	[b]28,574,737	133,561	[d]24,830,423	114,793
38220 22	Pneumatic	9	19,976,480	61,541	15,366,651	59,042
38220 25	Pressure responsive (pressurstats)	5	2,151,718	31,038	1,384,313	20,912
38220 30	Hydronic responsive	2	-	-	-	-
38220 35	Humidity responsive (humidstats)	-	-	-	-	-
38220 40	Light responsive	-	-	-	-	-
38220 45	Electrostatic responsive	2	1,091,935	[a]3,240	992,026	[a]3,355
38220 50	Liquid level	1				
38220 55	Defrost controls (except appliance regulators)	6	97,822,207	122,097	[r]86,721,558	102,574
38220 60	Igniters	4				
38220 65	Inherent motor protectors					
38220 66	Microprocessor-based load programmers for buildings energy control	4	361,046	19,178	454,902	26,283
	Computerized energy control systems for buildings:					
38220 67	Under 100 points (systems)	2	(X)	19,969	(X)	[r]18,421
38220 68	100 to 199 points (systems)	1				
38220 69	200 or more points	3				
38220 71	Upgrades or additions to existing computerized energy control systems for buildings (value only)	-	(X)	-	(X)	-
38220 74	Other	13	51,078,985	619,256	[r]44,999,031	[r]535,530
	Controls for major appliances such as domestic laundry and cooking appliances, refrigerators and freezers, vending machines, air conditioners, etc.:					
38220 75	Temperature responsive	23	154,195,702	324,210	137,905,735	[r]307,125
38220 80	All other controls for appliances	12	43,659,657	209,805	[r]35,198,717	[r]185,659
38220 98	Parts and components for controls for monitoring residential and commercial environments and appliance regulating controls (sold separately)	14	(X)	72,682	(X)	[r]68,803
		398	(X)	3,661,027	(X)	3,289,875
38230	Process control instruments					
	Industrial type instruments and related products primarily designed to measure, transmit, display, and/or control process variables in manufacturing, mining, energy conversion and public utilities. General purpose control system instruments (commonly called receiver-type), operating from standardized transmission signals (Electrical types a.c. or d.c. milliampere, millivolt, or telemetering signals; Pneumatic types,3 to 15 and 3 to 27 p.s.i. signals):					
	Electronic systems - unified architecture type:	35	1,619,844	246,810	[r]780,852	145,402
38230 35	Controllers (recording, indicating, or blind)	27	[a]403,943	[a]76,904	[r]85,264	[r]65,573
38230 36	Recorders, with or without self-contained set-point stations	26	[a]67,064	[a]30,284	[b]73,063	32,610
38230 37	Indicators, with or without self-contained set-point stations	17	26,870	[a]15,688	25,440	[a]12,454
38230 38	Auxiliary stations and analog computing devices associated with the above (including manual loaders, auto-to-manual stations, ration stations, adders, multipliers, integrators, etc.)	26	(X)	473,223	(X)	440,859
38230 07	Electronic systems - non-unified architecture type	37	(X)	[a]140,987	(X)	171,232
38230 12	Industrial multi-function process computers					
	Pneumatic systems: Includes all system-type control, display and computing instruments actuated from standardized pneumatic transmission signals):	15	64,474	64,978	53,635	51,163
38230 39	Controllers (recording, indicating, or blind)	10	6,743	8,857	[a]7,511	14,692
38230 40	Recorders, with or without self-contained set-point stations	5	[b]3,847	[b]1,459	[a]3,464	1,721
38230 41	Indicators, with or without self-contained set-point stations	6	23,597	7,827	22,691	7,761
38230 42	Auxiliary stations and analog computing devices associated with the above (including manual loaders, auto-to-manual stations, ratio stations, adders, multipliers, integrators, etc.)	15	[a]406,872	12,548	[c]529,892	11,006
38230 43	Receiver-type gauges, analog and digital	5	[a]8,612	14,868	[r]5,322	[r]13,311
38230 44	Annunciators, industrial; electromechanical and solid-state types					

See footnotes at end of table.

Table 3. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Temperature instruments (excluding receiver-type instruments):					
	Electrical and electronic measuring types (thermocouple resistance temperature detector, radiation, and other electrical sensors):					
38230 45	Direct-deflecting types (controllers for all types of electrical temperature sensors)	8	607,310	20,250	547,748	18,282
38230 46	Direct-deflecting types (indicators and recorders for all types of electrical temperature sensors)	14				
38230 47	Electromechanical self-balancing types (electric or pneumatic controllers for all types of electrical temperature sensors)	6	[a]29,027	14,448	[a]29,169	12,950
38230 48	Electromechanical self-balancing types (indicators, recorders, and integrators for all types of electrical temperature sensors)	8	[a]18,268	[a]30,667	10,369	21,993
38230 49	Electronic controllers for all types of electrical temperature sensors	28	215,772	[a]42,288	159,092	[r]30,250
38230 50	Digital indicators for all types of electrical temperature sensors (excluding data loggers)	25	[a]69,735	30,694	[a]64,586	32,568
	Transmitters, producing standardized electric or pneumatic analog transmission signals for all types of electrical temperature sensors:					
38230 54	Electric	13	[a]53,212	17,487	[a]51,411	14,743
38230 55	Pneumatic	5	1,340	888	1,751	1,132
	Mechanical measuring types:					
	Filled system (liquid filled, vapor pressures, gas filled, and mercury filled types):					
38230 52	Indicating or recording controllers	12	199,614	22,402	[r]178,156	[r]19,767
38230 53	Recorders, noncontrol	17	463,989	8,378	a [r]51,914	[r]6,175
38230 56	Indicators only (exclude indoor-outdoor and other household or appliance type thermometers)	20	1,353,510	29,872	[r]1,190,403	[r]27,381
38230 57	Transmitters producing standardized electric or pneumatic analog transmission signals	9	24,934	12,336	[r]23,420	[r]11,280
	Primary temperature sensors (excluding aircraft types):					
38230 59	Thermocouples and thermocouple lead wire	46	(X)	[a]142,898	(X)	[r]125,431
38230 60	All other types (resistance temperature detectors, radiation and optical sensors, thermistors, etc.)	37	(X)	[a]62,142	(X)	[r]59,398
	Pressure (gauge, absolute vacuum) and draft instruments connected to the process (excluding receiver-type instruments and receiver-type gauges):					
38230 61	Indicating or recording controllers	22	[a]286,525	[b]42,654	a [r]224,615	[b]36,658
38230 62	Recorders, noncontrol	13	44,049	3,117	a [r]8,875	[r]3,218
	Indicators only (excluding receiver-type gauges):					
38230 20	3-inch diameter and over	23	[a]3,681,716	102,692	[a]3,366,948	[r]91,102
38230 21	Under 3-inch diameter	15	23,763,145	60,770	18,461,814	[r]46,418
	Transmitters producing standardized analog transmission signals:					
38230 24	Transmitters producing standardized electronic analog transmission signals	28	595,942	101,596	[r]338,645	80,463
38230 25	Transmitters producing standardized pneumatic analog transmission signals	10	12,776	10,508	9,821	7,962
	Flow and liquid level instruments connected to the process:					
	Differential pressure types:					
38230 65	Indicating or recording controllers	16	[a]57,111	14,523	52,451	14,374
38230 66	Recorders, noncontrol and indicators, noncontrol	20	139,722	54,796	114,250	43,958
	Transmitters producing standardized analog transmission signals:					
38230 27	Transmitters producing standardized electronic analog transmission signals	16	[b]97,061	95,353	[b]83,111	81,782
38230 28	Transmitters producing standardized pneumatic analog transmission signals	10	21,758	23,819	20,841	22,183
38230 29	Primary pressure sensors (load cells, strain gauges, etc.)	6	[c]37,691	28,993	c [r]34,277	[r]25,870
38230 68	Primary flow elements (including orifice plates, venturi tubes, flow tubes, flow nozzles, pitot tubes, etc.)	23	[a]326,993	52,026	352,086	57,812
	Electromagnetic flowmeters:					
38230 03	Primary device (magnetic flow tube)	7	75,202	38,996	[r]63,242	[r]30,689
38230 01	Secondary device (magnetic transmitter, recorder, indicator or controller which receives signal directly from primary device)	13	[a]82,845	43,702	a [r]82,648	46,666
38230 04	Capacitance, ultrasonic, and other electronic types (including magnetic resonance, vortex-precession, and vortex-shedding type elements)	16	25,739	21,354	[r]23,257	[r]19,751
38230 71	Variable area-controlling, recording, indicating, and transmitting instruments and associated primary flow elements	15	788,210	68,449	593,791	57,237
38230 72	Float and displacement (controlling, recording, indicating, and transmitting instruments and associated primary flow elements.)	20	1,450,839	59,249	1,151,447	[r]49,874

See footnotes at end of table.

Table 1. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983--Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984 Quantity	1984 Value	1983 Quantity	1983 Value
	Process control instruments--Continued					
38230 73	Turbine, mass-flow and other types (controlling, recording, indicating, and transmitting instruments and associated primary flow elements)	20	[b]92,099	77,581	[b]73,930	[r]57,959
38230 74	Humidity instruments (controlling, recording, indicating, and transmitting, and associated primary humidity elements; excluding home and general purpose type)	12	[a]74,712	18,093	[b]53,702	10,214
	Continuous process instruments for on-stream gas and liquid analysis (including indicators, recorders, controllers, and analysis electrodes and cells; excluding laboratory analysis types):	10	[c]7,440	[a]26,084	[c r]7,240	[r]41,811
38230 75	Chromatographic analyzers	14	[b]4,901	40,848	[a r]3,484	[r]30,989
38230 76	Infrared analyzers	19	64,591	39,262	[r]71,247	[r]26,390
38230 77	Oxygen analyzers	29	[a]32,256	[a]23,973	[b r]43,995	18,919
38230 78	Other gas analyzers	9	44,043	[a]29,203	[r]29,330	18,373
38230 79	Ph analyzers	72	55,685	41,737	[r]41,357	34,922
38230 80	Other liquid analyzers					
	Instruments for all process variables not listed above (speed, weight, position, sequence, density, specific gravity, mechanical load, electrical load, millivolts):					
	Electrical and electronic types:					
38230 06	Direct-deflecting type controllers, indicators and recorders	7	[b]3,751	10,567	9,078	7,919
38230 08	Electromechanical self-balance electric or pneumatic controllers, indicators, recorders, integrators	7	[a]23,411	[b]32,367	[c r]22,288	[r]30,805
		8	97,440	[c]10,376	[r]5,430	[r]8,312
38230 83	Digital indicators	9	10,419	[a]5,167	[c]10,653	[r]5,198
38230 86	Transmitters producing standardized electric or pneumatic analog transmission signals					
	Mechanical measuring types:	5	7,886	7,931	5,075	6,317
38230 87	Indicating or recording controllers	4				[r]5,832
38230 88	Recorders, nonelectrical	4	96,092	6,062	53,112	
38230 89	Indicators only	9	221,446	26,214	[r]123,165	[r]23,403
38230 90	Transmitter, producing standardized electric or pneumatic analog transmission signals	105	(X)	[a]421,955	(X)	[r]409,517
38230 98	All other industrial process instruments					
38230 91	Parts, supplies, accessories, other primary sensors n.e.c., panelboards, and other equipment associated with process control instrumentation	109	(X)	449,415	(X)	[r]436,306
38242	Integrating and totalizing meters for gas and liquids	38	(X)	484,303	(X)	[r]449,414
	Gas meters, consumption registering:					
	Diaphragm type: Positive displacement; aluminum, iron, and tin case:					
38242 22	Residential size (up to 400 cu. ft./hr. of 0.64 specific gravity gas, at 0.5 inches water drop)	4	1,671,909	61,078	1,295,722	50,006
38242 24	Other sizes, including commercial and industrial	5	485,024	25,731	[r]81,795	22,436
38242 26	Rotary type (all sizes)	4	19,845	22,978	17,660	[r]21,632
38242 28	Turbine type (all sizes)	5	6,105	13,077	[r]5,422	[r]13,310
38242 29	Other gas meters, consumption registering[d]	-	-	-	-	-
	Liquid meters, positive displacement with registers and counters:					
	Water meters, consumption registering:	9	3,325,439	101,178	2,889,082	89,316
38242 33	Small meters, up to and including 1 inch	11	97,432	26,209	88,226	[r]24,363
38242 35	Intermediate meters, over 1 inch up to and including 2 inch	8	[b]35,132	[b]32,084	[a]30,084	28,396
38242 37	Large meters, over 2 inch	8	178,766	53,300	[r]253,555	54,237
38242 41	Liquid fuel dispensing meters (excluding service station dispensing pumps)	15	[a]243,134	88,829	[r]178,308	[r]76,804
38242 98	Other liquid meters; industrial bulk plants, pipeline, batching, treatment facilities	22	(X)	99,731	(X)	[r]69,024
38242 99	Parts and components for gas and liquid meters (sold separately)	54	(X)	219,542	(X)	[r]172,910
38243	Counting devices					
	Revolution counters, digital (including totalizing, predetermining, reset and production types, tally counter, lineal counters, measuring wheels, and vehicle operation registers):	18	5,524,248	[a]47,947	4,578,806	[r]42,715
38243 61	Mechanical input	14	[a]2,194,305	[a]34,610	[a]1,870,831	27,758
38243 64	Electrical input	23	[a]351,296	46,938	255,661	40,390
38243 67	Electronic input	7	[b]44,084	[a]21,895	37,465	16,932
38243 70	Pneumatic input	4				
38243 73	Other counters, including centrifugal tachometers and event recorders	5	9,529	2,950	[a]6,117	[a]1,580
38243 76	Taximeters	2	(X)	[a]57,632	(X)	[r]40,081
38243 61	Parking meters, toll meters, and similar equipment, including parts and components (sold separately)[e]	4	[c]553,133		[b]378,206	
38243 83	All other counting devices not specified above[e]	9	(X)	7,570	(X)	[r]3,454
38243 88	Components and parts for counting devices (sold separately)[e]	20	(X)	410,068	(X)	[r]358,902
38251	Electrical integrating instruments					
	A.c. watt-hour meters:	5				
	Single phase:	2	1,847,609	[a]116,289	1,833,337	131,407
38251 10	Detachable types	4				
38251 11	A-base types	8	538,007	43,108	380,981	47,880
38251 14	Switchboard types					
38251 15	Polyphase					

See footnotes at end of table.

Table 3. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Electrical integrating instruments—Continued					
38251 35	Demand meters (kw and kva), combined watt-hour and demand meters (single phase and polyphase), and combined watt-hour and time switch meters	7	338,689	85,137	306,310	74,784
38251 51	Other electrical integrating meters (including d.c. watt-hour meters, ampere-hour meters, and other miscellaneous integrating instruments not included in the above classifications)	9	(X)	[b]65,514	(X)	[r]50,582
38251 61	Parts for electric integrating meters (including meter mountings, registers, and test equipment) sold separately	9	(X)	60,020	(X)	[r]53,339
38252	**Test equipment for testing electrical, radio and communication circuits, and meters**	265	(X)	5,649,087	(X)	4,878,707
	Voltage, current, and resistance measuring equipment (except multimeters):					
	Electronic:					
38252 20	Digital	24	(X)	199,565	(X)	163,084
38252 21	Analog	30	(X)	40,285	(X)	40,560
38252 22	Electrical (excluding panel meters)	19	(X)	24,601	(X)	25,094
	Multimeters:					
	Electronic:					
38252 28	Digital	17	(X)	99,583	(X)	80,586
38252 29	Analog	9	(X)	7,793	(X)	6,592
38252 30	Electrical	9	(X)	17,033	(X)	16,699
	Power and energy measuring equipment:					
	Electronic:					
38252 25	Analog	17	(X)	41,397	(X)	[r]37,253
38252 26	Digital	13	(X)	13,784	(X)	[r]13,436
38252 27	Electrical power measuring equipment (excluding electrical integrating instruments, sold separately)	8	(X)	3,456	(X)	3,066
	Frequency counters, timers, and other frequency and time measuring equipment (excluding standards):[a]					
38252 31	Universal counters with time interval measuring capability[a]	5	(X)	95,054	(X)	88,576
38252 32	Microwave counters (capable of operating over 1300 MHz)[a]	8				
38252 33	Other frequency counters[a]	5	(X)	4,138	(X)	3,972
38252 34	Frequency meters[a]	5	(X)	11,304	(X)	7,086
38252 35	Other frequency counting and time measuring equipment[a]	7	(X)	7,825	(X)	9,015
	Waveform measuring and/or analyzing equipment:					
	Oscilloscopes and plug-in accessories:					
38252 12	Under 10 MHz	16	(X)	87,241	(X)	80,828
38252 10	10 MHz up to 99.9 MHz[a]	9	(X)	344,695	(X)	325,765
38252 11	100 MHz and over[a]	4				
38252 14	Oscillographs	3	(X)	4,479	(X)	3,327
	Spectrum analyzers:[a]					
38252 15	Capable of operating above 100 kHz[a]	3				
38252 17	Other spectrum analyzers[a]	3	(X)	280,646	(X)	268,274
38252 16	Other waveform measuring and analyzing equipment	31				
	Signal generating equipment:					
38252 56	Audio	18	(X)	42,807	(X)	[r]49,067
38252 58	RF (over 20 kc to 890 megacycles)	32	(X)	187,403	(X)	149,290
38252 59	Microwave (890 megacycles and above)	16	(X)	148,364	(X)	[r]129,163
	Field strength and intensity measuring equipment (including RFI measuring equipment):					
38252 91	Electronic	12	(X)	188,394	(X)	145,642
38252 92	Electrical field measuring equipment	4	(X)	13,809	(X)	9,764
	Impedance and standing wave ratio measuring equipment (transfer function measuring equipment):					
38252 93	Electronic impedance and related measuring equipment	11	(X)	28,191	(X)	[r]25,196
38252 94	Standing wave measuring equipment (slotted lines, sliding short, reflectometers, and other SWR equipment)	7	(X)	15,957	(X)	[r]10,862
38252 97	X-Y plotters (recorders), electronic	7	(X)	263,420	(X)	[r]182,564
	Automatic test and measuring equipment:[a]					
38252 44	Combination and/or group test sets	35	(X)	553,443	(X)	421,129
	Component part test sets:					
38252 45	Electron tube test equipment	1	(X)	2,274	(X)	2,543
	Semiconductor component test equipment:[a]					
38252 61	Memory[a]	5	(X)	81,573	(X)	62,496
38252 63	Linear[a]	4	(X)	177,933	(X)	45,065
38252 65	Microprocessor[a]	6	(X)	58,467	(X)	33,879
38252 67	Other semiconductor component test equipment[a]	18	(X)	118,529	(X)	85,319
38252 69	Circuit board loaded test equipment:[a]	5	(X)	131,674	(X)	101,106
38252 47	Other component part test sets and equipment[a]	9	(X)	19,705	(X)	14,513
38252 48	Equipment and subassembly test equipment n.e.c.	25	(X)	146,463	(X)	201,500

See footnotes at end of table.

Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Standards and calibration equipment for test measuring equipment, including laboratory types:					
38252 72	Electronic	29	(X)	98,105	(X)	100,050
38252 74	Electrical	10	(X)	32,441	(X)	32,162
	Analyzers for testing characteristics of internal-combustion engines (excluding aircraft):					
38252 37	Portable[a]	9	(X)	178,186	(X)	131,285
38252 38	Other[a]	11	(X)	130,309	(X)	101,030
38252 82	Associated devices for electronic and electrical test and measuring equipment	28	(X)	191,155	(X)	r117,597
	Communications test equipment n.e.c.:[a]					
38252 81	Network analyzers[a]	3				
38252 83	Cable backplane and other continuity testers[a]	2	(X)	49,662	(X)	22,408
38252 89	Fiber optics test equipment (OTDR, optical S/N meters, etc.)[a]	2				
38252 87	Other communications test, monitoring, and control equipment (except microwave)[a]	5	(X)	33,575	(X)	18,623
38252 52	Microwave test equipment n.e.c., (1,300 MHz and above)[a]	8	(X)	36,186	(X)	33,030
	Logic test, development, and analysis equipment:[a]					
38252 01	Logic analyzers, and similar logic state, timing, and signature analyzers[a]	2	(X)	(1)	(X)	(1)
38252 03	Microprocessor development systems[a]	1	(X)	(1)	(X)	(1)
38252 05	Pulse, function, and data generators and similar entered frequency synthesizers[a]	6	(X)	(1)	(X)	(1)
	Other field service test and measurement equipment:[a]					
38252 07	Logic probes, clips, comparators, pulsers, and current tracers[a]	4	(X)	(1)	(X)	(1)
38252 09	Other field service equipment specifically designed for other troubleshooting digital circuits[a]	1	(X)	(1)	(X)	(1)
38252 95	Other test measuring and analyzing equipment for electronic equipment for electronic and electrical circuits and equipment[a]	84	(X)	[1]1,435,843	(X)	[1]1,224,762
38252 99	Parts and components for test equipment for testing electrical, radio and communication circuits, and meters (sold separately)[a]	21	(X)	49,902	(X)	36,655
38253	Instruments to measure electricity	111	(X)	621,187	(X)	540,775
	Electrical indicating instruments (including both digital types and those where a pointer is made to move over a calibrated scale, such movement being effected by the action of the electrical current and/or voltage. Includes all aircraft types and all miniaturized instruments (+ or - 3%) and rectifier instruments which can be enclosed in a case suitable for mounting on a panel and are an end product. Excludes all instruments for use on motor vehicles which are capable of accuracies of + or - 2% of full scale indication):					
38253 08	Digital panel meters (DPM) between 0.05% and 1%, + or - 1 digit accuracy (excluding precision DVM's and electronic counter)	20	[a]346,539	[a]31,015	[b]299,375	26,891
38253 10	Analog solid state panel meters (generally of + or - 2% accuracy) with LED, LCD, or neon gas discharge display.	8	[b]83,812	[c]7,351	[b] r97,170	[c]9,863
	Panel type other than ruggedized or sealed (generally of 2% accuracy):					
38523 12	A.c. (including moving iron vane and dynamometer types)	12	417,304	12,446	515,826	11,535
38253 13	D.c. (including rectifier and self-contained thermocouple types)	18	[a]2,438,921	43,601	[a]2,513,004	41,570
38253 11	Panel types ruggedized or sealed (generally of 2% accuracy)	15	512,419	[a]11,037	[a]585,019	11,164
	Panel types with control or signal initiating means (including instrument relays):					
38253 16	Indicating	8	74,188	[a]3,393	74,359	3,680
38253 17	Nonindicating	3	4,090	1,669	7,802	3,485
38253 19	All other panel type instruments, including ammeters and voltmeters for motor vehicles	18	12,778,863	55,477	10,234,189	44,698
	Switchboard instruments which are generally of 1% accuracy:					
38253 23	A.c. (including moving iron vane and dynamometer types).	8	47,049	8,917	r57,577	10,178
38253 25	D.c. (including rectifier and thermocouple types)	8	[a]40,090	5,605	[a]45,517	6,488
38253 27	Elapsed time meters (with and without reset)	14	[a]1,369,518	[b]31,818	980,543	[a]26,629
	Portable instruments which are generally capable of accuracies within + or - 2% full scale indication, and can be enclosed in a case so that they can be moved and used at various locations, and which are an end product:					
38253 29	Portable types (accuracy rating 0.11% through 0.95%)	4	[a]2,168	[a]1,909	[b]2,220	1,479
38253 30	Portable type (accuracy rating 0.51% through 2%)	9	47,095	[c]5,032	[b]65,058	[a]6,090

See footnotes at end of table.

Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984 Quantity	1984 Value	1983 Quantity	1983 Value
	Instruments to measure electricity—Continued					
38253 33	Laboratory portable instruments with accuracies within + or - 1% up to 1/10% of full scale and better (all case sizes)	6	[a]3,641	2,935	[a] [r]4,450	[r]4,472
38253 37	Volt-ohm milliamter (VOM), accuracy 0.10% through 5%	3	383,897	13,235	183,102	9,464
38253 45	Other electrical indicating instruments (except self-balancing types)	9				
	Electrical recording instruments (portable and for panel mounting):					
38253 50	Direct deflecting (direct acting), except temperature calibrated instruments	6	35,335	17,389	39,168	16,233
	Oscillographic recorders:					
38253 63	Pen or stylus type	8	[c]149,185	178,846	[a] [r]78,597	[a]61,885
38253 65	Light beam type	4			c [r]26,060	70,565
38253 72	Other electrical recording instruments	21	(X)	121,566	(X)	106,104
	Parts and accessories for indicating and recording instruments:					
38253 74	Transducers for volts, amperes, watts, vars, frequency, temperature, and power factor	16	(X)	36,700	(X)	36,305
38253 75	Tachometer generators except aerospace types	11	(X)	[a]16,422	(X)	15,618
38253 76	Other including instrument shunts	18	(X)	17,524	(X)	14,379
38291	Aircraft engine instruments, except flight	43	(X)	256,824	(X)	335,247
38291 45	Temperature sensors, transmitters, and displays	18	(X)	70,405	(X)	[r]64,009
38291 46	Pressure ratio sensors, displays, and controls	7	(X)	26,104	(X)	21,997
38291 47	Pressure and vacuum sensors, transmitters, and displays	9	(X)	13,957	(X)	12,698
38291 58	Fuel and oil flow rate sensors, transmitters, and displays, including mixture controls	10	(X)	54,418	(X)	[r]59,656
38291 60	Fuel and oil quantity sensors, transmitters, and displays including densitometers	9	(X)	74,588	(X)	[r]69,677
38291 68	Tachometer generators and indicators	11	(X)	10,304	(X)	[r]10,919
38291 98	All other not specified above	17				
38291 99	Parts and components for aircraft engine instruments, except flight (sold separately)	1	(X)	107,056	(X)	96,299
38292	Physical properties testing and inspection equipment and kinematic testing and measuring equipment.	131	(X)	638,231	(X)	564,573
	Physical properties testing equipment including hardness, tensile, stress, strain, abrasion, strength, torsion, wear, and similar testing equipment (including components and parts sold separately):					
38292 33	Electrical and electronic types	47	(X)	[a]253,084	(X)	[r]237,133
38292 35	Other types	27	(X)	41,168	(X)	[r]35,417
38292 39	Parts for physical testing equipment (sold separately)[a]	2			(X)	-
	Physical properties inspection equipment, including flow detection thickness, measuring, and similar inspection equipment (including components and parts sold separately):					
38292 57	Electrical and electronic types	46	(X)	[a]151,270	(X)	[r]127,974
38292 59	Other types	22	(X)	42,684	(X)	35,011
38292 58	Parts for physical properties inspection equipment (sold separately)[a]	3	(X)	357		
	Kinematic testing and measuring equipment (including components and parts sold separately):					
38292 92	Vibration	20	(X)	88,935	(X)	75,843
38292 93	Acceleration and all other kinematic test and measuring equipment	22	(X)	59,444	(X)	52,995
38292 98	Parts for kinematic testing and measuring equipment (sold separately)[a]	3	(X)	1,069		
38293	Commercial meteorological, and general purpose instruments	108	(X)	328,738	(X)	[r]293,886
38293 20	Barometers and barographs, aneroid and mercurial types, including recorders, wall, pendant, meteorological, hygrothermographs, barometer-thermometer-humidity combination	15	(X)	[a]6,389	(X)	[r]7,264
38293 21	Hydrometers, glass, all types, including thermohydrometers	11	[c]344,774	2,554	[r]329,642	2,391
	Liquid-in-glass thermometers:					
38293 22	Engraved (etched) stem, thermoregulators, deep-sea reversing, laboratory, encased glass, ASTM standards, pocket case, max-min registering, except clinical thermometers	22	(X)	[a]9,559	(X)	[a]9,842
38293 23	Threaded and flanged types, fixed adjustable angle, conditioning, and refrigeration installations	14	[a]896,791	7,485	[c]909,805	7,128
38293 24	Household and commercial thermometers such as wall, outdoor, domestic science, cupcase, filled systems, indoor-outdoor	12	10,825,496	17,707	10,867,820	14,645
38293 34	Clinical (fever) thermometers (including digital)	8	33,797,302	14,244	33,139,224	10,422
	Bimetal thermometers:					
38293 25	Threaded and flanged types, for pipeline and duct installations, including general and pocket test	19	[b]2,414,173	25,524	[b]2,981,091	24,444
38293 26	Domestic science, commercial general test, indoor, outdoor, desk models, oven, refrigerator	14	6,768,947	12,181	7,640,765	15,654

See footnotes at end of table.

Table 2. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983—Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Commercial meteorological, and general purpose instruments—Continued					
38293 27	Infrared thermometers, portable	3				
38293 28	Humidity indicating and recording instruments such as bi-hygroscopic and hygroscopic element, indicators, psychrometers, wet and dry bulb, hygrographs, indicating hygrometers	10	(X)	[a]15,276	(X)	[r]13,315
38293 31	Other meteorological instruments, including speed and direction instruments, rain gauges, thermographs, and parts (sold separately)	20				
38293 32	Geophysical instruments, including hydrographic and hydrological[a]	6	(X)	81,733	(X)	[r]67,718
38293 33	Other commercial and industrial instruments (except aircraft) including compasses, altimeters, and parts (sold separately)	39	(X)	134,094	(X)	[r]115,863
38294	Nuclear radiation detection and monitoring instruments	55	(X)	486,752	(X)	[r]503,399
38294 02	Radiation detecting elements (including ion chambers)	10	23,214	31,430	[r]38,847	[r]39,024
38294 04	Solid state detectors	7	13,955	14,193		
38294 06	Nuclear monitoring instruments (including environmental, personal dosimetry, and medical monitors, both stationary and portable types)	13				
38294 07	Medical and biological counting systems for in vivo counting	3	(X)	88,544	(X)	[r]93,696
38294 09	Sample and flow counting systems, manual and automatic	9	(X)	30,157	(X)	29,487
38294 19	Scalers	8	14,908	12,463	13,125	11,171
38294 21	Special amplifiers for nuclear applications	7	4,408	[r]7,094	4,393	6,072
	Pulse analyzers (including nuclear spectrometers):					
38294 22	Single channel pulse height analyzers	7	[b]3,520	27,685	872	3,156
38294 23	Multichannel pulse height analyzers	7			2,638	25,704
38294 25	Count rate meters	8	1,637	1,750	[r]1,429	[r]1,639
38294 29	Measurement and control devices using beta, gamma, or neutron gauge technology	13	(X)	119,343	(X)	[r]106,632
38294 28	Input-output accessories for multichannel analyzers	4	(X)	[b]7,616	(X)	1,759
38294 30	Nuclear power supplies	6			(X)	5,422
38294 32	Neutron photon activation analysis systems	2	(X)	[c]17,879	(X)	25,402
38294 34	Nuclear instrument modules n.e.c.	9				
38294 39	Other nuclear radiation detection and monitoring instruments	11	(X)	113,123	(X)	[r]140,235
38294 98	Parts and components for nuclear radiation detection and monitoring instruments (sold separately)	9	(X)	15,273	(X)	[r]13,980
38326	Analytical and scientific instruments (except optical)	158	(X)	2,543,147	(X)	[r]2,438,551
	Electrochemical instruments:					
38326 01	Ph electrodes and meters	14	(X)	[b]37,020	(X)	[b]38,191
38326 03	Ion selective electrodes and meters	9	(X)	[c]21,465	(X)	[c]17,390
38326 04	Electrophoresis chambers and supplies	7	(X)	20,972	(X)	28,690
38326 02	Coulometric analysis, laboratory type	4	(X)	[a]18,755	(X)	23,283
38326 06	Electrolytic conductivity instruments (laboratory type)	4	(X)	[a]1,389	(X)	1,071
38326 09	Moisture analyzers	2				
38326 11	Titrators, including redox (oxidation-reduction potential) instruments	3	(X)	1,121	(X)	1,134
38326 18	Specific ion measuring instruments, laboratory type	-	-	-	-	-
38326 52	Polarographic equipment (analyzers)	3	(X)	24,017	(X)	17,922
38326 05	Other, except process type	9				
	Photometers:					
38326 31	Flame	3	(X)	[b]7,399	(X)	[r]6,755
38326 33	Other (including fluorescents, light scattering reflectants, helium glow, and light measuring)	5				
	Chromatographic instruments:					
38326 07	Gas	12	20,781	135,135	[r]26,512	124,066
38326 35	Liquid	17	[a]43,927	[a]243,935	[r]35,735	[r]214,392
38326 37	Other, including paper, gel, thin layer	4				
38326 10	Spectrographs	3	(2)	(2)	(2)	(2)
	Spectrophotometric instruments:					
38326 41	Atomic absorption	4	5,874	81,486	[r]4,458	[r]62,686
38326 43	Flame emission	1				
38326 45	Optical emission, including spark, arc, and glow	3				
38326 46	Microprobe source emission, laser source Raman, and laser microprobe source Raman spectrometers)	2	13,368	[c]17,197	14,882	27,210
38326 47	Optical emission with inductively coupled plasma, ICP	2				
38326 13	Infrared	12	4,166	[a]80,885	[r]3,542	[r]65,672
38326 14	Ultraviolet, visible and colorimeters	18	21,957	120,088	21,187	116,287
38326 15	Fluorescent instruments, including fluorometers	7	[a]980	12,878	[r]856	[r]9,351
38326 16	Densitometers, reflection, and glossmeters	7	(2)	(2)	(2)	(2)
38326 17	Other including near ultraviolet and Raman	5	(X)	[2]38,439	(X)	[2]31,743

See footnotes at end of table.

Table 3. QUANTITY AND VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1984 AND 1983--Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1984		1983	
			Quantity	Value	Quantity	Value
	Analytical and scientific instruments etc.--Continued					
38326 19	Thermal analysis instruments, including thermogravimetric analyzers (TGA), quantitative thermal analyzers (QTA) and differential thermal analyzers (DTA)	9	(X)	40,578	(X)	37,751
38326 30	Nuclear magnetic resonance instruments, including electron paramagnetic resonance (EPR), and electron paramagnetic spin types (EP)	2				
38326 21	Microscopes, electron and proton, including scanning,	4			548	44,934
38326 53	Particle beam emitation instruments including electron microprobes, auger, energy ion spectroscopes, secondary ion mass spectrometer (SIMS), ion microprobes, and proton microprobes	3	434	39,332	[b]45	6,558
38326 55	Photon excitation analyzers, including x-ray fluorescence - simultaneous, x-ray fluorescence - sequential, x-ray fluorescence - sequential with diffraction, x-ray fluorescence - diffraction, x-ray diffraction, and energy dispersive system (EDS)	6	[b]353	26,475	[r]356	[r]19,582
38326 23	Mass spectroscopy instrumentation	11	(X)	105,206	(X)	[r]94,141
	Clinical laboratory instrumentation (includes instruments used in the clinical laboratory for measuring, analyzing, and processing clinical specimens)	(X)	(X)	723,591	(X)	[r]744,292
38326 71	Chemistry (measure and identify substances, e.g. metabolites, enzymes, and drugs)	11	[a]10,441	255,885	[a r]10,934	[r]225,571
38326 72	Hematology (measure and identify substances or cells contained in blood or substances influencing the development and clotting of blood, e.g., cell counting coagulation factors)	9	10,055	165,375	[r]11,667	[r]184,194
38326 73	Microbiology (enumerate or identify pathogenic organisms or measure their susceptibility to anti-microbial agents)	5				
38326 74	Histology (process tissue and cells, e.g., tissue	1	(X)	21,876	(X)	22,526
38326 75	Blood bank and immunology (process blood and specimens for testing; measure and identify, using immunoassay, substances in clinical specimens)	9	(X)	44,960	(X)	[a]49,474
38326 76	Other clinical laboratory instrumentation not specified above	9	20,112	235,495	[r]21,798	[r]264,527
38326 59	Elemental analysis instruments, including carbon, hydrogen, nitrogen, oxygen, and sulphur	9	228,758	110,985	173,618	85,573
38326 92	Amino acid, protein and/or peptide analyzers[6]	2				
38326 96	Other analytical and scientific instruments n.e.c., including molecular weight, monochrometers (analytical		(X)	[a]174,538	(X)	151,617
38326 98	type), nephelometers (except meteorological), osmometers, particle size analyzers, photo multipliers, surface area analyzers, turbidometers, and breatholyzers[6]	49				
	Parts, components, and accessories for analytical and scientific instruments (sold separately), including photo tubes, thermal conductivity sensors, thermopiles, etc., which are not specifically provided for in product class 38325, optical instruments	46	(X)	440,301	(X)	[r]448,300
38325	Optical instruments	132	(X)	1,432,314	(X)	1,059,913
38325 01	Binoculars and telescopes, prismatic and nonprismatic	9	(X)	[a]16,984	(X)	[r]14,382
38325 05	Optical alignment and display instruments and systems, except photographic	16	(X)	(D)	(X)	(D)
38325 10	Optical test equipment including standard sources, modulators, optical comparators, interferometers (except optical microscopes)	30	(X)	137,196	(X)	[r]102,602
38325 15	Optical microscopes	6	(X)	67,055	(X)	58,363
38325 20	Optical components, including mirrors, filters, gratings, coatings, movements, reflectors, reticles, prisms, monochrometers, light amplifiers, Kerr cells, etc	67	(X)	183,603	(X)	[r]165,254
38325 21	Lenses, except opthalmic focus lenses: Unmounted lenses	40	(X)	[a]68,029	(X)	[a]64,534
	Mounted lenses:					
38325 22	Photographic lenses	10	(X)	10,917	(X)	[r]10,979
38325 23	Other mounted lenses	18	(X)	[a]87,589	(X)	52,304
38325 25	Other optical instruments, excluding analytical instruments listed above and sighting and fire control equipment	42	(X)	[3]861,141	(X)	[3 r]391,495
38324	Sighting, tracking, and fire-control equipment, optical type	45	(X)	528,091	(X)	479,179
38324 01	Made from lenses, prism, etc., produced in the same plant	25	(X)	[a]284,638	(X)	294,212
38324 02	Made from purchased lenses, prism, etc	27	(X)	243,453	(X)	184,967

Note: Data for two or more product codes may be combined to avoid disclosing figures for individual companies.

The percent of estimation of each item is indicated as follows (see "Description of Survey" for a discussion of estimation of missing reports): [a]10 to 25 percent of this item has been estimated. [b]25 to 50 percent of this item has been estimated. [c]Over 50 percent of this item has been estimated.

* New or revised for 1984. - Represents zero. (D) Data withheld to avoid disclosing figures for individual companies. n.e.c. Not elsewhere classified. [r]Revised by 5 percent or more from previously published figures. (X) Not applicable.

[1] Data for the following product codes are combined to avoid disclosing figures for individual companies for both 1984 and 1983: [2]38252 01, 38252 03, 38252 05, 38252 07, 38252 09, and 38252 95. [2]38326 10, 38326 16, and 38326 17. [3]38325 05 and 38325 25.

Table 3. VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS FOR ANNUAL SURVEY MA38R COMPARED WITH 1982 CENSUS OF MANUFACTURES

(Millions of dollars)

Product code	Product description	MA38R[1]		1982	
		1984	1983	MA38R	Census of Manufactures
3811	Engineering and scientific instruments	(X)	(X)	(X)	2,964.4
38111	Aeronautical, nautical, and navigational instruments	1,535.6	1,428.6	1,404.7	1,418.7
38112	Laboratory and scientific apparatus	1,044.8	976.2	1,028.1	1,083.6
38113	Surveying and drafting instruments and associated equipment	306.9	248.2	256.2	259.9
38110 00	Engineering and scientific instruments n.e.k., typically for establishments with 10 employees or more	(2)	(2)	(2)	128.2
38110 02	Engineering and scientific instruments n.e.k., typically for establishments with less than 10 employees				74.0
3822	Controls for monitoring residential and commercial environments and appliance regulating controls	(X)	(X)	(X)	1,544.5
38220 00	Controls for monitoring residential and commercial environments and appliance regulating controls, typically for establishments with 20 employees or more	1,884.6	1,678.8	1,439.4	1,512.3
38220 02	Controls for monitoring residential and commercial environments and appliance regulating controls n.e.k., typically for establishments with less than 20 employees				32.2
3823	Process control instruments	(X)	(X)	(X)	3,915.1
38230 00	Process control instruments, typically for establishments with 20 employees or more	3,661.0	3,289.9	3,750.8	3,814.2
38230 02	Process control instruments n.e.k., typically for establishments with less than 20 employees				100.9
3824	Fluid meters and counting devices	(X)	(X)	(X)	787.1
38242	Integrating and totalizing meters for gas and liquids	404.2	449.4	493.5	519.6
38243	Counting devices	219.5	172.9	166.8	182.0
38244	Motor vehicle instruments, except electric	(2)	(2)	(2)	76.2
38240 00	Fluid meters and counting devices n.e.k., typically for establishments with 20 employees or more	(2)	(2)	(2)	11.8
38240 02	Fluid meters and counting devices n.e.k., typically for establishments with less than 20 employees				17.5
3825	Instruments to measure electricity	(X)	(X)	(X)	5,575.6
38251	Integrating instruments, electrical	410.1	358.0	339.0	363.2
38252	Test equipment for testing electrical, radio, and communication circuits and motors	5,649.1	4,878.7	4,384.6	4,455.2
38253	Other electrical measuring instruments	621.2	540.8	539.0	556.7
38250 00	Instruments to measure electricity n.e.k., typically for establishments with 10 employees or more	(2)	(2)	(2)	103.1
38250 02	Instruments to measure electricity n.e.k., typically for establishments with less than 10 employees				98.4
3829	Measuring and controlling devices n.e.c.	(X)	(X)	(X)	2,073.4
38291	Aircraft engine instruments, except flight	356.8	335.2	390.3	311.0
38292	Physical properties and kinematic testing equipment	638.2	544.4	580.7	635.2
38293	Commercial, meteorological, and general purpose instruments	328.7	293.9	325.4	365.2
38294	Nuclear radiation detection and monitoring instruments	486.8	503.4	561.5	596.4
38290 00	Measuring and controlling devices n.e.c., n.s.k., typically for establishments with 5 employees or more	(2)	(2)	(2)	123.1
38290 02	Measuring and controlling devices n.e.c., typically for establishments with less than 5 employees				42.5
3832	Analytical and optical instruments	(X)	(X)	(X)	3,678.4
38326	Analytical and scientific instruments	2,543.1	2,438.6	1,990.3	2,088.4
38325	Optical instruments and lenses	1,432.5	1,059.9	893.7	921.8
38324	Sighting, tracking, and fire-control equipment, optical type	528.1	479.2	492.2	505.4
38320 00	Analytical and optical instruments n.e.k., typically for establishments with 10 employees or more	(2)	(2)	(2)	118.3
38320 02	Analytical and optical instruments n.e.k., typically for establishments with less than 10 employees				43.5
3494	Valves and pipe fittings	(NA)	(NA)	(NA)	8,705.1
34940	Aerospace type valves, pneumatic and hydraulic	^{3}195.7	^{3}175.8	^{3}208.9	242.2
3494A	Other metal valves for piping systems and equipment except plumbing and heating valves	(2)	(2)	(2)	3,425.5
34949	Plumbing and heating valves and specialties excluding plumbers' brass goods	(2)	(2)	(2)	220.2
34944		(2)	(2)	(2)	1,491.2
34945	Metal fittings, flanges, and unions for piping systems				

See footnotes at end of table.

Table 3. VALUE OF SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS FOR ANNUAL SURVEY MA38B COMPARED WITH 1982 CENSUS OF MANUFACTURES—Continued

(Millions of dollars)

Product code	Product description	MA38B[1]		1982	
		1984	1983	MA38B	Census of Manufactures
	Valves and pipe fittings—Continued				
34947	Automatic regulating and control valves	1,197.2	1,146.5	1,184.5	1,233.0
34948	Solenoid valves (except power transfer)	[3]268.3	[3]202.6	[3]201.5	206.1
34949	Fittings for metal and plastics tubing used in fluid power transfer systems	[3]382.5	[3]317.7	[3]295.0	302.7
34949F	Hydraulic and pneumatic hose or tube end fittings and assemblies, except aerospace type	[3]430.3	[3]333.9	[3]329.0	319.7
34949G	Aerospace type hydraulic and pneumatic hose or tube end fittings and assemblies	[3]134.8	[3]129.3	[3]117.3	119.0
34949H	Parts for fluid power valves	[3]112.9	[3]100.4	[3]107.2	101.0
34940 00	Valves and pipe fittings n.s.k., typically for establishments with 20 employees or more	(2)	(2)	(2)	128.9
34940 02	Valves and pipe fittings n.s.k., typically for establishments with less than 20 employees				121.1

Note: In the 1982 Census of Manufactures, shipments data for establishments of small companies (typically those with fewer than 5 employees for industries 3811, 3822, 3823, 3824, 3825, 3829, and 3832, and fewer than 20 employees for industry 3494) were estimated from administrative records data rather than collected on census questionnaires. These shipments are included in product codes 38110 02, 38220 02, 38230 02, 38240 02, 38250 02, 38290 02, 38320 02, and 34940 02. Products not adequately identified by detail product were coded to the appropriate industry (four digits) followed by "000."

(NA) Not available. N.e.c. Not elsewhere classified. N.s.k. Not specified by kind. (X) Not applicable.

[1] Data from the 1983 and 1984 Annual Surveys of Manufactures will be released at a later date.

[2] Detail data available only for the census of manufactures. A substantial portion of these data are derived from administrative records. See note above.

[3] Detailed product data for these product classes are published in Current Industrial Report MA-35N, Fluid Power Products, Including Aerospace.

Table 4A. QUANTITY AND VALUE OF EXPORT SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1966

(Quantity in units; value in thousands of dollars)

Export number[1]	Product description	Quantity	Value[2]
661.3020	Industrial and laboratory furnaces and ovens, nonelectric, for processing nonmetal materials	(NA)	9,396
661.3030	Parts n.e.s.p.f. of nonelectric furnaces for processing nonmetal materials n.e.s.p.f.	(NA)	15,925
661.3040	Industrial and laboratory furnaces and ovens, nonelectric, for processing metal materials, other than metal melting or hot metal rolling, forging, and annealing furnaces	(NA)	5,694
661.3050	Parts n.e.s.p.f. of nonelectric metal processing furnaces	(NA)	13,367
661.7015	Sterilizers and autoclaves and parts	(NA)	23,037
661 7620	Centrifuges	15,770	64,276
661.7640	Parts n.e.s.p.f. of centrifuges	(NA)	54,404
680.2730	Solenoid valves	680,071	19,771
680.2741	Control valves, pneumatically actuated	889,792	31,685
680.2742	Control valves, electric and electrohydraulic actuated	190,831	33,751
680.2743	Regulator valves, self-operative	5,440,224	97,448
680.2749	Parts of taps, cocks, valves, etc.	(NA)	134,713
683.9525	Industrial and laboratory furnaces and ovens, electric	199,977	82,151
683.9540	Parts n.e.s.p.f., industrial and laboratory ovens, furnaces and induction and dielectric heating equipment	(NA)	31,874
686.1030	Resistors, variable, wirewound, including potentiometers	19,634,579	21,286
686.1035	Resistors, variable, not wirewound, including potentiometers	188,140,846	37,906
706.0600	Lenses, prisms, mirrors, and other optical elements, not mounted, other than ophthalmic	(NA)	35,705
706.2220	Photographic lenses, mounted	104,144	3,092
706.2340	Projection lenses, mounted	473,311	6,277
706.2360	Lenses, prisms, mirrors, and other optical elements, mounted, other than photographic or projection lenses	(NA)	9,830
706.5410	Binoculars, including opera glasses, designed for use with infrared light	2,093	2,199
706.5420	Binoculars, including opera glasses, other than for use with infrared light	70,951	8,222
706.5430	Telescopic gun sights and parts thereof	(NA)	4,069
706.5440	Refracting or reflecting telescopes n.e.s.p.f., astronomical instruments, frames, mountings, and parts thereof, for use with infrared light, other than binoculars and telescopic gun sights	(NA)	7,994
706.5450	Refracting or reflecting telescopes n.e.s.p.f., astronomical instruments, frames, mountings, and parts thereof, other than for use with infrared light or binoculars or telescopic gun sights	(NA)	12,712
706.7400	Compound optical microscopes	42,689	7,719
706.7800	Electron, proton, and similar microscopes and diffraction apparatus	(NA)	5,266
706.9200	Firearm and missile fire control and sighting equipment n.e.s.p.f., and parts thereof	(NA)	89,382
706.9400	Optical appliances and instruments n.e.s.p.f., and parts, including frames and mountings	(NA)	17,196
709.6540	Radiation measuring and controlling equipment, and parts thereof, other than for medical or dental use.	(NA)	29,381
709.6660	Radiation apparatus, other than for medical and dental use, or for measuring and controlling	(NA)	14,779
710.1020	Depth sounding apparatus and parts thereof	(NA)	45,821
710.1050	Navigational instruments, e.i.e., other than depth-sounding apparatus	(NA)	299,916
710.1070	Navigational instruments, n.e.i.e., other than depth-sounding apparatus	(NA)	28,707
710.1820	Meteorological and hydrological instruments, e.i.e., and parts thereof	(NA)	27,642
710.1840	Meteorological and hydrological instruments, n.e.i.e.	(NA)	4,764
710.2820	Geophysical instruments and apparatus, and parts thereof, e.i.e.	(NA)	360,371
710.2840	Geophysical instruments and apparatus, and parts thereof, n.e.i.e.	(NA)	74,634
710.3820	Surveying, including photogrammetrical, and hydrographic instruments, e.i.e.	(NA)	42,428
710.3840	Surveying, including photogrammetrical, and hydrographic instruments, n.e.i.e.	(NA)	7,707
710.8900	Optical measuring or checking instruments and appliances and parts thereof	(NA)	53,899
711.0100	Balances of a sensitivity of 5 centigrams or better, with or without weights, and parts thereof	(NA)	11,986
711.2420	Machines and appliances for determining the strength of articles or materials under compression, tension, torsion, or shearing stress, and parts thereof, e.i.e.	(NA)	106,533
711.2440	Machines and appliances for determining the strength of articles or materials under compression, tension, torsion, or shearing stress, and parts thereof, n.e.i.e.	(NA)	11,054
711.3320	Hydrometers and similar floating instruments, e.i.e., other than industrial process type	(NA)	12,350
711.3340	Hydrometers and similar floating instruments, n.e.i.e., or industrial process type	(NA)	25,586
711.8002	Control instruments, chiefly used in air conditioning, refrigeration, comfort heating systems, and major appliances	(NA)	134,097
711.8004	Instruments for measuring, checking, or automatically controlling temperature, e.i.e., industrial process, and parts thereof	(NA)	65,492
711.8010	Instruments for measuring, checking, or automatically controlling temperature, e.i.e., other than industrial process, and parts thereof	(NA)	60,375
711.8014	Instruments for measuring, checking, or automatically controlling temperature, n.e.i.e., industrial process, and parts thereof	(NA)	9,143
711.8018	Instruments for measuring, checking, or automatically controlling temperature, n.e.i.e., other than industrial process, and parts thereof	(NA)	25,983
711.8022	Instruments for measuring, checking or automatically controlling pressure, draft, or vacuum, e.i.e., industrial process, and parts thereof	(NA)	89,763
711.8026	Instruments for measuring, checking, or automatically controlling pressure, draft, or vacuum, e.i.e., other than industrial process, and parts thereof	(NA)	21,371
711.8030	Dial indicating pressure gauges, n.e.i.e., industrial process, and parts thereof	(NA)	13,407
711.8034	Instruments for measuring, checking, or automatically controlling pressure, draft, or vacuum, n.e.i.e., industrial process, other than dial indicating pressure gauges, and parts thereof	(NA)	35,442

See footnotes at end of table.

Table 4A. QUANTITY AND VALUE OF EXPORT SHIPMENTS OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1980—Continued

(Quantity in units; value in thousands of dollars)

Export number[1]	Product description	Quantity	Value[2]
711.9010	Dial indicating pressure gauges, n.e.i.e., other than industrial process type, and parts thereof	(NA)	30,053
711.9042	Instruments for measuring, checking, or automatically controlling pressure, draft, or vacuum, n.e.i.e., other than industrial process, other than dial indicating pressure gauges, parts	(NA)	3,232
711.9044	Instruments for measuring, checking, or automatically controlling flow or liquid level, e.i.e., industrial process, and parts thereof	(NA)	74,764
711.9050	Instruments for measuring, checking, or automatically controlling flow or liquid level, e.i.e., other than industrial process, and parts thereof	(NA)	38,443
711.9054	Instruments for measuring, checking, or automatically controlling flow or liquid level, n.e.i.e., industrial process, and parts thereof	(NA)	46,288
711.9058	Instruments for measuring, checking, or automatically controlling flow or liquid level, n.e.i.e., other than industrial process, and parts thereof	(NA)	20,251
711.9062	Display and control receiver-type instruments which operate from standardized electronic transmission signals, industrial process, and parts thereof	(NA)	158,163
711.9066	Display and control receiver-type instruments which operate from standardized pneumatic transmission signals, industrial process, and parts thereof	(NA)	12,118
711.9070	Other industrial process instruments, e.i.e.	(NA)	186,786
711.9073	Other industrial process instruments, n.e.i.e.	(NA)	17,013
711.9080	Other controlling instruments, e.i.e., n.e.p.f., other than industrial process	(NA)	58,479
711.9090	Other controlling instruments, n.e.i.e., n.e.p.f., other than industrial process	(NA)	19,250
711.8710	Instruments to determine the atomic, ionic, or molecular composition of matter, e.i.e.	(NA)	368,237
711.8722	Spectroscopes, nonelectric	201	1,293
711.8724	Spectrophotometers, nonelectric	2,617	6,081
711.8726	Photometers, nonelectric	1,447	2,623
711.8728	Other spectrometric instruments, nonelectric, n.e.p.f.	2,981	5,817
711.8729	Parts, n.e.p.f., for nonelectric spectrometric instruments	(NA)	3,877
711.8732	Gas chromatographs, nonelectric	973	6,375
711.8734	Liquid chromatographs, nonelectric	2,937	13,786
711.8736	Other chromatographic instruments, nonelectric, n.e.p.f.	874	4,442
711.8738	Parts, n.e.p.f., for nonelectric chromatographic instruments	(NA)	21,674
711.8741	Electrochemical instruments	8,747	10,991
711.8743	Thermal analysis instruments, nonelectric	2,623	4,171
711.8745	Nuclear magnetic resonance instruments, nonelectric	14	212
711.8746	Mass spectroscopes, all types, nonelectric	9	172
711.8747	Chemical analysis equipment, nonelectric, n.e.p.f.	5,843	9,526
711.8749	Parts, n.e.p.f., for chemical analysis equipment, n.e.p.f.	(NA)	12,228
711.8750	Physical or chemical analysis instruments and apparatus, e.i.e., other than instruments to determine the atomic, ionic, or molecular composition of matter	(NA)	399,407
711.8760	Physical or chemical analysis instruments and apparatus, n.e.i.e., other than instruments to determine the atomic, ionic, or molecular composition of matter	(NA)	32,633
711.9220	Revolution counters, production counters, taximeters, milometers, pedometers, etc., e.i.e.	(NA)	5,504
711.9225	Revolution counters, production counters, taximeters, milometers, pedometers, etc., n.e.i.e.	(NA)	4,873
711.9230	Speedometers and tachometers designed for use in civil aircraft	(NA)	1,750
711.9232	Speed indicators and tachometers, stroboscopes, e.i.e.	(NA)	11,333
711.9240	Parts, n.e.p.f. for revolution counters, production counters, etc.	(NA)	29,841
711.9237	Speed indicators and tachometers, stroboscopes, n.e.i.e.	(NA)	1,998
712.1510	Instruments and apparatus for measuring or detecting alpha, beta, gamma, X-ray, cosmic, or similar radiations	126,256	83,164
712.5005	Equipment chiefly used for testing the electrical characteristics of internal combustion engines and parts thereof	(NA)	71,370
712.5020	Equipment for testing electrical, radio, and communication circuits: Apparatus to test voltage, current, and resistance, and parts thereof	(NA)	171,573
712.1560	Parts n.e.p.f. for instruments and apparatus designed for measuring and detecting radiation	(NA)	33,023
712.5025	Equipment for testing electrical, radio, and communication circuits: Apparatus to test frequency and parts thereof	(NA)	90,832
712.5032	Equipment for testing electrical, radio, and communication circuits: Oscilloscopes and oscillographs and parts thereof	(NA)	128,473
712.5035	Equipment for testing electrical, radio, and communication circuits: Wave form measuring and/or analyzing apparatus, other than oscilloscopes and oscillographs	(NA)	247,044
712.5040	Equipment for testing electrical, radio, and communication circuits: Instruments for testing or measuring combinations of electrical characteristics and parts, thereof	(NA)	429,327
712.5045	Equipment for testing electrical, radio, and communication circuits: Other than to test, measure, or analyze voltage, current, resistance, frequency, wave form, or combinations for the aforementioned, and parts thereof	(NA)	193,069
712.5052	Recording instruments for measuring or checking electrical quantities, other than for electrical characteristics of internal combustion engines or for electrical radio, and communication circuits, or for electrical meters	(NA)	158,004
712.5055	Nonrecording instruments for measuring or checking electrical quantities, other than for electrical characteristics of internal combustion engines or for electrical, radio, and communication circuits, or for electrical meters	(NA)	85,490
713.0110	Electricity meters and standard meters therefor	514,626	15,815
713.0130	Gas meters and standard meters therefor	48,267	9,297
713.0140	Liquid meters and standard meters therefor	184,736	17,738
713.0150	Parts n.e.p.f. for electricity meters	(NA)	16,497
713.0160	Parts n.e.p.f. for gas and liquid meters	(NA)	20,996

E.i.e. Electrical (including electronic). (NA) Not available. N.e.i.e. Nonelectrical (where electrical includes electronic).
N.e.p.f. Not specifically provided for.

[1] Based on Schedule B export numbers.
[2] See "Comparison of Export, Import, and Domestic Output Data" in the text for valuation of the data.

Table 6b. QUANTITY AND VALUE OF EXPORTS FOR CLASSIFICATION OF SELECTED INSTRUMENTS AND RELATED PRODUCTS, 1958

(Quantity in units; value in thousands of dollars)

Export number[1]	Product description	Quantity	Value[2]
661.3000	Industrial and laboratory furnaces and ovens, nonelectric, and parts thereof	(NA)	25,711
661.8000	Centrifuges and parts thereof, other than cream separators	(NA)	36,934
661.9100	Centrifuges and parts n.e.s.p.f., certified for civil aircraft	(NA)	612
683.9520	Industrial and laboratory furnaces and ovens, electric, and parts thereof	(NA)	40,048
685.1000	Resistors, variable, wire wound, including potentiometers	4,295,706	10,032
685.1005	Resistors, variable, not wire wound, including potentiometers	453,636,767	145,202
708.0300	Lenses, optical, not mounted, other than ophthalmic	13,144,093	25,619
708.0500	Prisms, optical unmounted	(NA)	3,883
708.0700	Mirrors, optical, unmounted	(NA)	1,305
708.0900	Other optical elements, not mounted	(NA)	9,371
708.2100	Lenses, projection, mounted	991,979	13,417
708.2300	Lenses, photographic, mounted	9,322,614	250,986
708.2340	Lenses, optical, other than projection or photographic, mounted	1,703,305	37,619
708.2500	Prisms, optical, mounted	(NA)	2,649
708.2700	Mirrors, optical mounted	(NA)	995
708.2900	Other optical elements, mounted	(NA)	45,921
708.5100	Field glasses and opera glasses, other than prism binoculars	1,776,557	6,899
708.5200	Prism binoculars	3,772,247	71,634
708.5400	Telescopic sights for rifles for use with infra red light	1,336,451	20,428
708.5600	Telescopes, not designed for use with infrared light	1,648,289	34,322
708.6100	Telescopes, monocular or binocular, designed for use with infrared light	23,719	849
708.6300	Astronomical instruments n.e.s.p.f.	779	306
708.6500	Parts, etc., for telescopes and astronomical instruments n.e.s.p.f.	(NA)	1,900
708.7100	Compound optical microscopes, nonphotographing, nonprojecting, value not over $25	937,327	6,117
708.7200	Compound optical microscopes, nonphotographing, nonprojecting, value over $25 but not over $50	30,192	1,220
708.7300	Compound optical microscopes, nonphotographing, nonprojecting, value over $50	30,922	8,387
708.7500	Compound optical microscopes, projecting	47,619	2,405
708.7600	Compound optical microscopes, photographing	13,435	12,457
708.7680	Electron, proton, and similar microscopes and diffraction apparatus	(NA)	31,640
708.8900	Other optical appliances and instruments n.e.s.p.f.	(NA)	20,731
709.6640	Radiation measurement and control equipment, other than for medical and dental use, and parts thereof	(NA)	2,173
709.6660	Other radiation apparatus, other than for medical or dental use, or for measurement or control	(NA)	5,089
710.0400	Photogrammetrical instruments and parts thereof	(NA)	4,124
710.0600	Rangefinders, other than surveying rangefinders	12,742	526
710.0800	Other optical type surveying, hydrographic, navigational, meteorological, hydrological, and geophysical instruments, other than photogrammetrical or nonsurveying rangefinders	(NA)	24,679
710.1200	Surveying compasses and parts thereof	(NA)	477
710.1400	Gyroscopic compasses and parts thereof	(NA)	5,213
710.1500	Gyroscopic compasses, if certified for civil aircraft use	(NA)	818
710.1600	Compasses and parts thereof, other than surveying or gyroscopic	(NA)	5,711
710.2000	Ships' logs	501	133
710.2600	Anemometers	246	62
710.2100	Parts for ship logs	(NA)	86
710.3400	Seismographs, portable or field type and parts thereof	(NA)	447
710.3800	Seismographs, other than portable of field type, and parts thereof	(NA)	49
710.4000	Surveying and hydrographic instruments, other than optical type, not of metal	(NA)	1,379
710.4200	Surveying and hydrographic instruments, other than optical type, of metal	(NA)	2,485
710.4480	Navigational instruments, other than optical, and parts thereof	(NA)	11,196
710.4700	Navigational instruments/parts certified for civil aircraft	(NA)	10,788
710.5000	Other surveying, hydrographic, navigational, meteorological, hydrological, and geophysical instruments n.e.s.p.f.	(NA)	1,729
711.0800	Balances of a sensitivity of 5 centigrams or better, other than jewelers' balances, and parts thereof	(NA)	1,098
711.2500	Machines and appliances for determining the strength of articles or materials under compression, tension, torsion, or shearing stress, and parts thereof	(NA)	9,817
711.3000	Hydrometers and similar floating instruments, whether or not incorporating thermometers	(NA)	825
711.3100	Thermometers, clinical	3,029,984	1,462
711.3200	Thermometers, liquid filled, graduated, other than clinical	6,725,390	4,232
711.3300	Thermometers, liquid filled, graduated, certified for civil aircraft	6,069	6
711.3600	Thermometers, other than liquid filled with graduations or certified for use in civil aircraft	(NA)	14,744
711.3900	Thermometers, other than liquid filled with graduations, certified for use in civil aircraft	(NA)	126

See footnotes at end of table.

Table 4b. QUANTITY AND VALUE OF IMPORTS FOR CONSUMPTION OF SELECTED INSTRUMENTS AND RELATED PRODUCTS: 1981—Continued

(Quantity in units; value in thousands of dollars)

Import number[1]	Product description	Quantity	Value[2]
711.4000	Pyrometers, optical	(NA)	119
711.4200	Pyrometers, other than optical	(NA)	183
711.4500	Barometers, aneroid, surveying with altimeter setting	(NA)	102
711.4700	Barometers, aneroid, other than surveying with altimeter setting	(NA)	1,037
711.4900	Barometers, other than aneroid	(NA)	524
711.5500	Hygrometers and psychrometers	(NA)	593
711.6000	Thermographs, barographs, hygrographs, and other recording instruments	(NA)	896
711.6700	Other hydrometers, thermometers, pyrometers, barometers, hygrometers, psychrometers, etc., including combinations of the foregoing and articles of which the foregoing is an integral part n.s.p.f.	(NA)	2,677
711.7300	Flow meters, heat meters incorporating liquid supply meters and counters	140,918	2,846
711.7600	Flow meters, heat meters incorporating liquid supply meters and counters, certified for civil aircraft	284	154
711.7700	Flow meter, counters, and heat meter parts	(NA)	2,204
711.7840	Parts of gauges, regulators, thermostats, etc.	(NA)	35,672
711.7830	Instruments and apparatus for measuring, checking, or automatically controlling the flow, depth, pressure, or other variables of liquids or gases, or for automatically controlling temperature n.s.p.f.	(NA)	137,423
711.7900	Instruments and apparatus for measuring, checking or automatically controlling the flow, depth, pressure, or other variables of liquids or gases, or for automatically controlling temperature n.s.p.f., Canadian article	(NA)	16,363
711.8400	Polarimeters, refractometers, spectrometers, gas analysis apparatus, and other instruments or apparatus for physical or chemical analysis, optical, and parts thereof	(NA)	5,239
711.8800	Polarimeters, refractometers, spectrometers, gas analysis apparatus, and other instruments or apparatus for physical or chemical analysis, other than optical	(NA)	33,052
711.9100	Gauges, thermostats, etc. n.s.p.f., certified for civil aircraft	(NA)	10,324
711.9000	Tachometers, Canadian article	(NA)	2,876
711.9500	Bicycle speedometers and parts thereof	(NA)	5,521
711.9620	Speedometers and tachometers and parts thereof	(NA)	40,730
711.9840	Revolution counters, production counters, odometers, pedometers, counters similar to the foregoing articles n.s.p.f.	(NA)	30,501
711.9900	Revolution counters, production counters, odometers, pedometers, counters similar to the foregoing speedometers (other than bicycle) and tachometers, Canadian	(NA)	6,128
712.0000	Speedometers and tachometers certified for civil aircraft	10,177	1,099
712.0500	Electrical measuring, checking, analyzing, or automatically-controlling instruments or apparatus, optical types, and parts thereof	(NA)	31,454
712.0600	Electrical measuring, checking, analyzing, or automatically controlling instruments or apparatus, optical types, certified for civil aircraft	(NA)	17
712.1000	Ships' logs and depth sounding instruments and apparatus, electrical	21,383	1,803
712.1510	Instruments and apparatus for measuring or detecting alpha, beta, gamma, X-ray, cosmic, or similar radiation, electrical	(NA)	13,819
712.1560	Parts of electric apparatus for measuring radiation	(NA)	4,660
712.2000	Quinaugraphs, electrical, and parts thereof	(NA)	12,340
712.2500	Anemometers, electrical	(NA)	139
712.2700	Parts of electric anemometers	(NA)	158
712.4700	Automatic flight control instruments and apparatus designed for use in aircraft, electrical, and parts thereof	(NA)	58,379
712.4800	Electric aircraft flight instruments, etc., certified for civil aircraft	(NA)	60,782
712.4910	Surveying (including photogrammetrical surveying), hydrographic, navigational, meteorological, hydrological, and geophysical instruments, electrical, and parts thereof	(NA)	68,756
712.4930	Balances of a sensitivity of 5 centigrams or better, with or without their weights, electrical, and parts thereof	(NA)	27,782
712.4930	Machines and appliances for determining the strength of articles or materials under compression, tension, torsion, or shearing stress, electrical, and parts thereof	(NA)	9,283
712.4941	Hydrometers and similar floating instruments, whether or not recording instruments, and combinations of the foregoing instruments, electrical	(NA)	9,029
712.4950	Instruments and apparatus for measuring, checking, or automatically controlling the flow, depth, pressure, or other variables of liquids or gases, or for automatically controlling temperature, electrical	(NA)	88,408
712.4955	Parts of instruments and apparatus for measuring, checking, or automatically controlling the flow, depth, pressure or other variables of liquids or gases, or for automatically controlling temperature	(NA)	50,731
712.4960	Polarimeters, refractometers, spectrometers, gas analysis apparatus and other instruments or apparatus for physical or chemical analysis, electrical, and parts thereof	(NA)	119,387
712.4971	Instruments and apparatus to measure or check electrical quantities, electrical	(NA)	279,854
712.4975	Other instruments, electrical n.s.p.f.	(NA)	485,582
712.5100	Electrical measuring, checking, analyzing, or automatically controlling instruments and apparatus, Canadian	(NA)	49,093
712.5200	Parts for electrical measuring, checking, analyzing, or automatically controlling instruments and apparatus	(NA)	37,287
713.0500	Gas, liquids, and electricity supply and production meters, value not over $10	145,381	195
713.0700	Electricity supply or production meters and standard meters therefor, value over $10 but not over $15	1,317	23
713.0900	Electricity supply or production meters and standard meters therefor, value over $15	17,230	2,187
713.1100	Gas and liquid supply or production meters, including standard meters, value over $10	42,596	3,350
713.1500	Parts of meters	(NA)	10,978
713.1700	Stroboscopes	250,942	3,381
713.1900	Parts for stroboscopes	(NA)	126

(NA) Not available. n.s.p.f. Not specifically provided for.

[1] Based on TSUSA import codes.
[2] See "Comparison of Export, Import, and Domestic Output Data" in the text for valuation of the data.

Table 5. SELECTED INSTRUMENTS AND RELATED PRODUCTS—SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION: 1984

(Value in thousands of dollars)

Product code[1]	Product description	Manufacturers' shipments (value f.o.b. plant)	Exports of domestic merchandise: Value of exports[2]	Exports of domestic merchandise: Estimated producers' shipments[3]	Percent exports to manufacturers' shipments[4]	Imports for consumption: value in foreign country[5]	Apparent consumption (value)[6]	Percent imports to apparent consumption
34947 —	Automatic valves (regulating and control type)...	1,197,151	[7] 307,017	[7] 244,150	20	[7] (NA)	[7] (NA)	(NA)
34948 —	Solenoid valves.....	388,250	156,084	131,141	40			
38111 —	Aeronautical, nautical, and navigational instruments, except aircraft engine instruments.....	1,533,648	[7] 376,194	[7] 348,130	23	[7] 181,344	1,368,862	13
38111 —	Laboratory and scientific apparatus.....	2,044,833	390,389	370,577	18	154,855	979,111	17
38113 —	Surveying and drafting instruments and associated equipment and laboratory furniture.....	306,281	90,135	46,993	15	[7] 103,689	363,919	29
38230 —	Controls for monitoring residential and commercial environments and appliance regulating controls.....	1,984,584	[7] 401,554	[7] 378,023	20	[7] 260,083	1,868,486	16
38230 —	Process control instruments.....	3,661,027	767,491	732,516	20	637,114	3,575,625	18
38242 —	Integrating meters, nonelectrical type.....	484,203	[7] 48,031	45,216	9	364,032	803,019	45
38243 —	Counting devices.....	319,542	[7] 94,299	[7] 91,117	23	85,736	854,181	34
38251 —	Integrating instruments, electrical.....	410,068	[7] 32,311	[7] 30,410	7	[7] 8,181	388,831	2
38252 —	Test equipment for testing electrical, radio, and communication circuits, and motors.....	5,649,087	[7] 1,375,382	[7] 1,483,083	26	[7] 279,034	4,445,876	6
38253 —	Instruments to measure electricity.....	621,187	155,236	146,130	24	781,951	1,257,888	62
38291 —	Aircraft engine instruments, except flight.....	356,034	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
38292 —	Physical properties and kinematic testing and inspection equipment.....	650,231	117,587	110,696	17	18,089	545,634	3
38293 —	Commercial, meteorological, and general purpose instruments.....	330,730	505,347	475,734	(NA)	[7] 196,692	(NA)	(NA)
38294 —	Nuclear radiation detection and monitoring instruments.....	488,732	[7] 169,347	[7] 150,931	31	25,295	361,096	7
38336 —	Analytical and scientific instruments (except optical).....	2,543,147	805,543	833,134	26	[7] 189,338	3,079,351	9
38325 —	Optical instruments.....	1,432,514	184,845	149,872	10	654,889	1,937,531	34
38324 —	Sighting, tracking, and fire-control equipment, optical type.....	529,091	93,651	75,930	14	336	453,685	(Z)

(NA) Not available. (Z) Less than one-half of 1 percent.

[1] See table 6 for comparison of SIC-based product codes, Schedule B export numbers, and TSUSA import numbers.

[2] Source: Bureau of the Census report, EM 546, U.S. Exports.

[3] These values were derived by use of adjustment factors to exclude freight, insurance, and other charges incurred in moving goods to the port of export. This adjustment is made to convert the values to an approximation of the producers' value of exported goods. Current adjustment factors are based on data for 1981 which are published in Origin of Exports of Manufactured Products, MQ1(AS)-5, appendix B. The adjustment factor for products corresponding to industry group 349, miscellaneous fabricated metal products, is 0.6489. The adjustment factor for products corresponding to industry group 381, engineering, scientific instruments, is 0.9234. The adjustment factor for products corresponding to industry group 382, measuring, controlling devices, is 0.9414. The adjustment factor for products corresponding to industry group 383, optical instruments and lenses, is 0.8108.

[4] These percentages are based on comparing estimated producers' export values with total domestic manufacturers' shipments values.

[5] Source: Bureau of the Census reports, IM 145-X U.S. Imports for Consumption and General Imports and report IM 146, U.S. Imports for Consumption.

[6] Apparent consumption is derived by subtracting the estimated producers' value of exports from the sum of manufacturers' shipments plus imports for consumption.

[7] Data include products which are extraneous to this product class. Therefore, the values may be overstated. See table 6 for these import and export numbers which contain extraneous products and have been included in two or more product classes.

Table 6. COMPARISON OF STANDARD INDUSTRIAL CLASSIFICATION-BASED CODES, SCHEDULE B EXPORT COMMODITY, AND TSUSA IMPORT COMMODITY: 1984

Product code	Product description	Export number[1]	Import number[2]
34867	Automatic valves (regulating and control type)	4688.2041 4688.2742 4688.2743 4688.3749	(NA)
34868	Solenoid valves	688.2730 *4688.3760	(NA)
38111	Aeronautical, nautical, and navigational instruments, except aircraft engine instruments	710.1000 710.1050 710.1070 711.9050	710.0800 710.1600 710.1500 710.1600 710.2000 710.2100 710.4600 710.4700 *710.5000 710.5000 712.4700 712.4800
38112	Laboratory scientific apparatus	661.3020 661.3030 661.3046 661.3050 661.7015 661.7620 661.7640 685.9325 685.9340 711.0100	661.3000 661.9000 661.9100 683.9520 710.3400 710.3600 711.0000 712.2000 712.4920
38113	Surveying and drafting instruments and associated equipment and laboratory furniture	710.3830 710.3840	710.0400 *710.0800 710.1200 *710.4000 *710.4200 *710.5000 712.4910
38230	Controls for monitoring residential and commercial environments and appliances regulating controls	711.9002 711.8010 711.8018 711.8026 711.8034 711.8042 711.8050 711.8058 711.8080 711.8090	*711.7500 *711.7600 *711.7820 712.4950 712.4955 *711.7900
38230	Process control instruments	*686.1030 *686.1035 *686.1035 711.8006 711.8014 711.8022 711.8030 711.8054 711.8046 711.8054 711.8062 711.8066 711.8070 711.8075	*686.1030 *686.1035 *711.7500 *711.7600 *711.7700 *711.7820 *711.7840 *711.7900 711.8100 *712.0500 *712.4950 *712.4955 *712.5100 *712.5200
38242	Integrating meters, nonelectrical type	713.0130 713.0140 713.0160	*711.7500 *711.7600 *711.7820 *711.7900 *712.0500 *712.4950 712.4955 *713.0500 *713.0700 *713.0900 *713.1100 713.1500
38243	Counting devices	711.9220 711.9225 711.9228 *711.9232 *711.9237 711.9240	711.9000 711.9300 711.9820 711.9840 711.9900
38251	Integrating instruments, electrical	713.0110 713.0150	*713.0500 *713.0700 *713.0900 *713.1100 *713.1700 *713.1900
38252	Test equipment for testing electrical, radio, and communication circuits, and meters	*712.5005 712.5000 712.5025 712.5032 712.0535 712.5040 712.5046 712.5031 712.5055	*686.1030 *686.1035 *712.0500 *712.4975 *712.5100 *712.5200 *713.1700 712.4971
38253	Instruments to measure electricity	*686.1030 *686.1035 *711.9232 *711.9237 *712.5005	(NA)
38291	Aircraft engine instruments, except flight	(NA)	(NA)
38292	Physical properties and kinematic testing and inspection equipment	711.3430 711.3440	711.2500 712.4930
38293	Commercial, meteorological, and general purpose instruments	710.1820 710.1840 710.2820 710.2840 711.3320 711.3340	*710.0800 710.2600 *710.4000 *710.4200 *710.5000 711.3000 711.3100 711.3200 711.3300 711.3800 711.3900 711.4000 711.4300 711.4500 711.4700 711.4900 711.5500 711.6000 711.6700 712.2500 712.4700 *712.4910 712.4941
38294	Nuclear radiation detection and monitoring instruments	709.6640 709.6660 712.1520 712.1560	709.6640 709.6660 712.1510 712.1560
38326	Analytical and scientific instruments (except optical)	708.7800 711.0710 711.8722 711.8724 711.8726 711.8728 711.8729 711.8732 711.8734 711.8736 711.8738 711.8741 711.8743 711.8745 711.8746 711.8747 711.8749 711.8750 711.8760	708.7800 711.8600 711.8800 712.4960
38325	Optical instruments	708.0400 708.2220 708.2240 708.2260 708.5410 708.5420 708.5440 708.5450 708.7480 708.9400 710.4800	708.0300 708.0500 708.0700 708.0800 708.2100 708.2320 708.2340 708.2500 708.2700 708.2900 708.5100 708.5200 708.5600 708.5800 708.6100 708.6300 708.6500 708.7100 708.7200 708.7500 708.7600 708.8900 *711.8600 *712.9500
38324	Sighting, tracking, and fire-control equipment, optical type	708.9430 708.9200	710.8600

*Part of this code is comparable. (NA) Not available.

[1]Source: 1984 edition Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States. See Table 4A for detailed export data and description.

[2]Source: Tariff Schedules of the United States Annotated (TSUSA), 1984. See Table 4B for detailed import data and descriptions.

DESCRIPTION OF SURVEY

Scope of Survey. This survey covers firms engaged in the manufacture of instruments and related products, except very small firms (generally less than 20 employees) for which 1982 Census of Manufactures data were derived from administrative records of other government agencies.

Survey Methodology. The statistics in this publication were collected by mail on Bureau of the Census annual Form MA38B, Selected Instruments and Related Products. The survey panel includes all known producers of these products, except the very small firms excluded from the scope of the survey. Approximately 1,900 establishments are included. No estimate is derived for the small firms excluded from the survey.

Reliability of Data. Survey error may result from several sources: (1) inability to obtain information about all cases in the survey; (2) response errors; (3) definitional difficulties; (4) differences in the interpretation of questions; (5) mistakes in recording or coding the data obtained; and (6) other errors of collection, response, coverage, and estimation for missing data. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is due to imputing data for nonrespondents, for late reporters, and for data which fail logic edits. Missing figures are imputed based on yearly movements shown by reporting firms. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is not precisely known, but is assumed to be small. The degree of uncertainty regarding the accuracy of the published data, however, increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

Revisions to Previous Period Data. Statistics for previous years may be revised as the result of corrected data from respondents, late reports for which imputations were made as described above, or other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Revisions include changes to prior period data resulting from reconciliation of the results of this survey with the 1982 Census of Manufactures to correct differences in reported data between the two series and to identify and verify new establishments included in the scope of this survey. Table 3 presents a comparison of data from the two series by census product class following the reconciliation.

Adjustment for Price Change. All dollar figures included in this publication are in current dollars; i.e., they have not been adjusted for price change.

EXPLANATION OF TERMS

Quantity and Value of Shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable sales to unaffiliated customers; i.e., the value includes an appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

Electronic Systems—Unified Architecture. Includes system-type control, display and computing instruments actuated from standardized electrical transmission signals in which control and signal conditioning are integral with the display/operator interface.

Electronic Systems—Non-Unified Architecture. Includes system-type instruments and related equipment actuated from standardized electrical transmission signals in which control and signal conditioning are separated from the display/operator interface. Equipment includes single loop and multi-loop controllers, dedicated operator stations, shared CRT-based operator work stations, process I/O equipment, communication equipment and other related miscellaneous equipment such as power supplies, racks panels, cables, console furniture, printers, tape drivers, mounting hardware, shelves, nests calibrators, testors, etc. Does not include multi-function process computers reported in 38230 12.

Industrial Multi-Function Process Computers. Includes the hardware and standard software of the CPU and all peripheral equipment of the computers that provide centralized processing intelligence for two or more of the following functions: data manipulation and reporting, supervisory control and data acquisition, calculations using control algorithms, data base management, use of a high-level programming language and operator interface.

COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; on the other hand, the export and import classification system is more materials oriented. Aside from the differences in the basic commodity classifications, there are additional problems involving import data, since there are a substantial number of imported commodities which are not produced in the United States or which are produced only in very small quantities and which, therefore, have no comparable

domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to the problems mentioned above, there are also the following problems affecting the comparability of the three sets of data.

Valuation. There are different methods of valuation for the three types of data:

- *Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

- *Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance and other charges to the export point.

  Estimated producers' values of exports have also been developed. These values more closely approximate the values reported for domestic output because they exclude freight, insurance, and other charges applied from the producing plant to the export point.

- *Imports*—Valued at the first port of entry in the United States. It includes c.i.f. (cost, insurance, and freight), duty, and other charges to the import point.

Duplication in Quantity and Value of Output. Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

Low-Value Export and Import Transactions. Detailed commodity information is not included for individual export shipments valued at not more than $250 or for individual export shipments valued at not more than $500. This is believed to have only negligible effects on the statistics for the bulk of the commodities.

Manufacturers' Shipments, Not Specified by Kind. The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

Time Lag Between Output and Exports. There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

"Direct" vs "Total" Commodity Exports and Imports. Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

Used Commodities. With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

Geographic Area of Coverage. Import and export data reflect the movement of merchandise into and out of U.S. foreign trade zones, the U.S. Virgin Islands, and the U.S. customs territory (includes the 50 States, the District of Columbia, and Puerto Rico).

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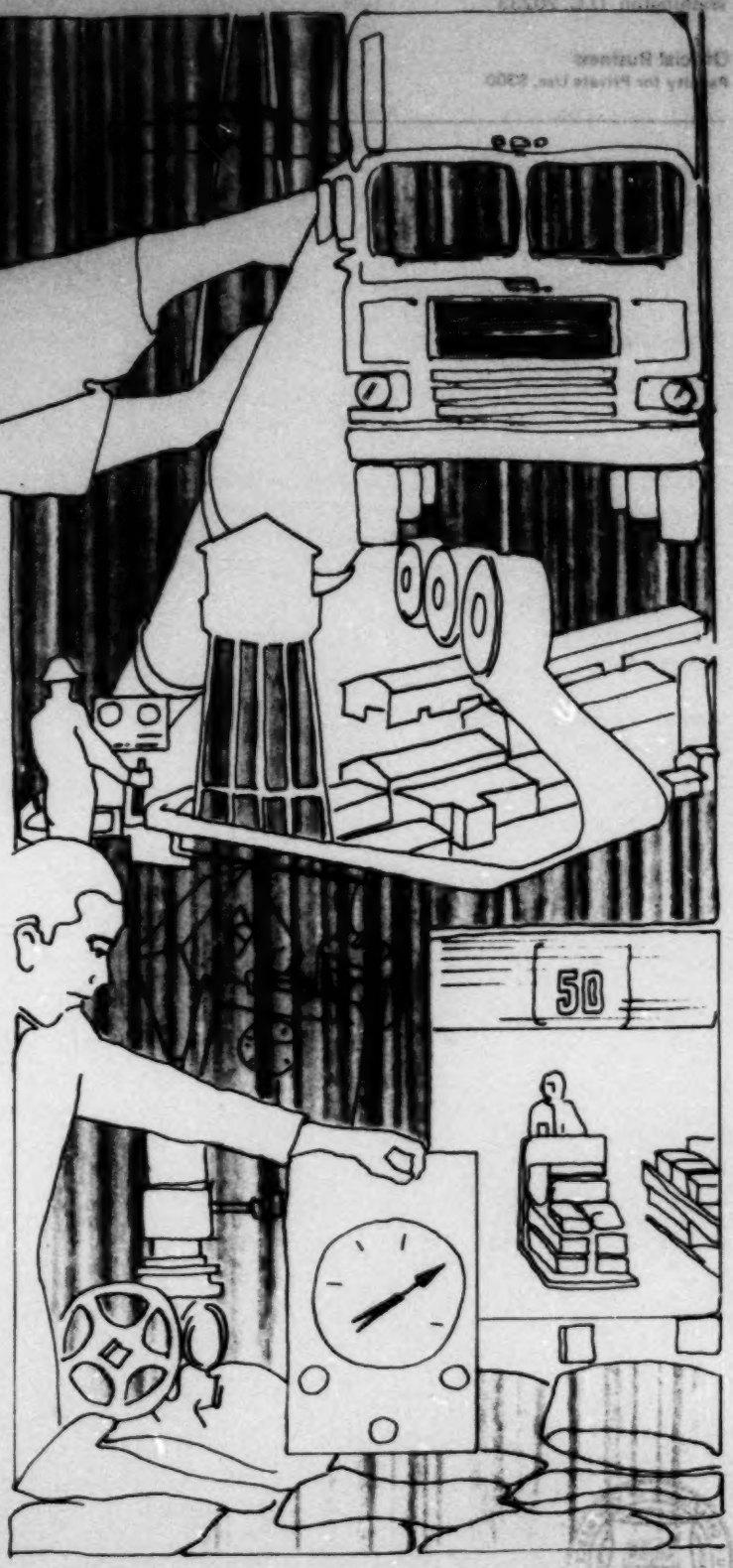

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